

DESIGN AND MACHINING SIMULATION OF A PRISMATIC PART USING NX CAD/CAM AN OVERVIEW

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ABSTRACT

The extraction of feature plays an important role in economical machining. The main object of this paper the extraction of feature by using NX CAD/CAM. NX software provides complete computer-aided manufacturing (CAM) solutions from machine tool programming to post processing and machining simulation. NX CAM's advanced functions in each of its modules can maximize returns on investments. In the latest machine tool technology, adopted across by many manufacturing industries. NX delivers proven capabilities for manufacturing component related to the aerospace, automotive, medical device, mold and die, and other selected machinery industries. With NX CAM, the program of prismatic parts faster by previewing and specifying a sequence of volumes to be machined. The volume-based 2.5 dimensional work in milling, presents with the current in-process work piece, allow you to pick the defining faces of a machining volume, and then display the calculated cut levels and the updated in-process work. In this paper the various shapes have been designed, machine simulated by using NX CAM software.

KEYWORDS: Volume-Based 2.5-Axis Milling, Computer-Aided Manufacturing

INTRODUCTION

A feature is a topological pattern in CAD software solution, and refers to all sorts of information like shape, functional or manufacturing information [1] [2]. Machining by features shape models extracted by the various methods like DXF files, IGEP etc are superior to other kind of machining process. The features encircle information of geometrical shape and parametric information such as round holes, slots, bosses pockets, counter sunk and boring [3]

Computer-aided manufacturing commonly refers to the use of numerical control (NC) computer software applications to create detailed instructions by the application of G and M codes. The instruction which drives the computer numerical control machine tools in production. To-days high competition world made obligatory to manufacturers to produce high quality components. Numerous in a variety of parts industries depend on the capabilities of CAM to produce those global standards components. A Computer Automated Machining can include the use of computers to define a manufacturing plan from tooling design, computer-aided design (CAD) model preparation, NC programming, coordinate measuring machine (CMM) inspection programming, machine tool simulation, to post-processing.

Feature based modeling is an indispensable tool for integrating design and manufacturing process in Computer Aided Process Planning System.

In this current decade the manufacturing features and feature-based representations have become a basic part of research in manufacturing systems integration. In the most general sense, features are higher level entities that model the correspondence between design information and manufacturing activities. For example, while basic CAD data consists of

geometric and topological information, features can be used to represent how an artifact might be manufactured or you can automatically create optimized NC programs directly from part design models by using feature-based machining (FBM) in NX. FBM automatically recognizes and programs a wide range of machining feature types including holes, pockets and slots. FBM can save up to 90 percent on NC programming time by automating routine tasks in NX. The fundamental representation for mechanical designs within a CAD system is the solid model.

The fundamental representation for mechanical design within a CAD system is the solid model. For the most part this exclusively geometric and topological representation is rather limiting. While solid models provide increasingly good ways to model shape and form, they do not lend themselves well to direct reasoning about manufacturing activities. The concept of a feature attempts to bridge this gap by modeling the relationship between the local geometric and topological configurations of a design and the higher level abstractions. [4]

In this way semantic information can be conveyed along with the shape. Feature and feature based approaches have proven popular in variety of computer aided design and computer aided manufacturing application domains. The reason for this increasing popularity is that for most CAD/CAM problems the design needs to be interpreted in terms of the need of the particular application. Feature technology relies heavily on the geometric and topological capabilities of solid modeling and CAD systems. Existing feature research deals predominantly with machining applications. [4]

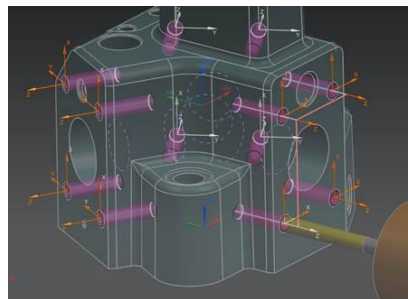


Figure 1: Feature Based Modelling by Using NX CAM [Hole Drill] [6]

EXTRACTION OF FEATURE BY USING NX CAD/CAM SOFTWARE SOLUTIONS

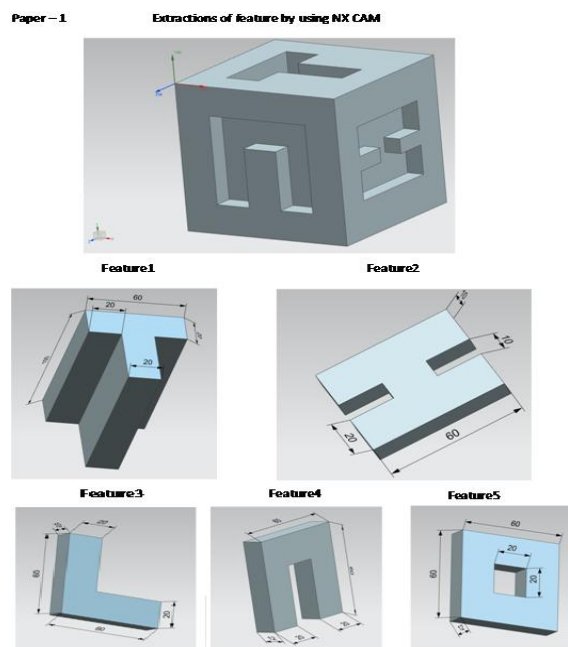
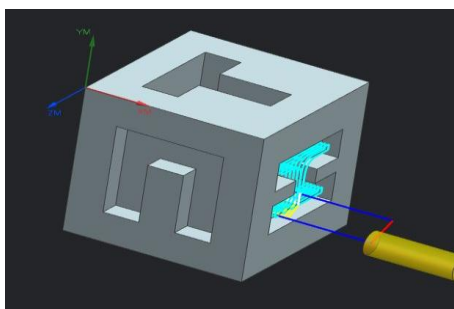


Figure 2

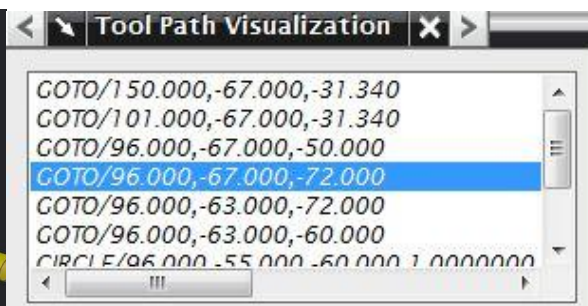
MACHINING OF VARIOUS SHAPES BY USING NX - CAM

NX provides complete solutions for computer-aided manufacturing by providing appropriate software solutions in the areas of machine tool programming, post processing and also machining simulation. The maximum utilization of NX CAM's in advanced functions or modules can too make the most of returns on investments. Transversely, NX proved high capabilities in manufacturing within its constraint.

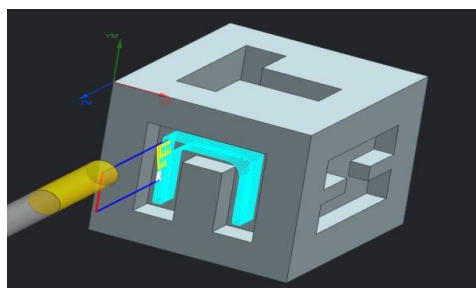
In the aerospace industries, particularly the manufacturing of complex prismatic structures are more. In automotive, medical industries no doubt there is lot of vacuum to machine some intricate molds and dies. The prismatic components are more compatible with NX CAM which can be programmed faster and within no time the component is machined or manufactured. The volume-based 2.5-axis milling processor and 2.5 dimensional work presents the current in-process work piece that allow to pick the defining faces of a machining volume. Finally the machining process will be taken place with selected tool cutter. [5]



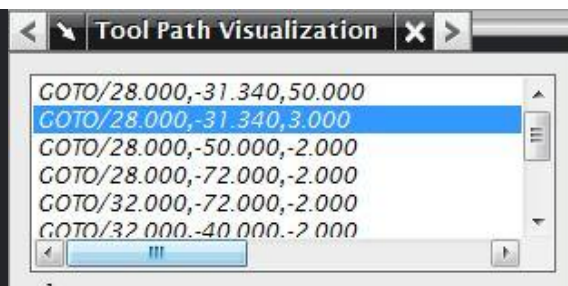
H – Shape Machining



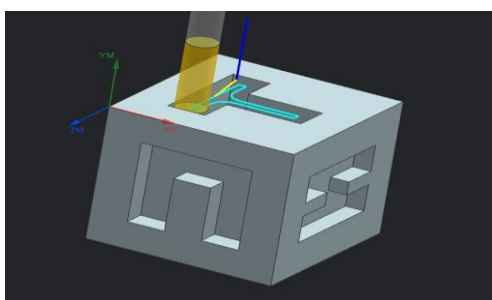
H – Shape Machining Tool Path Visualization



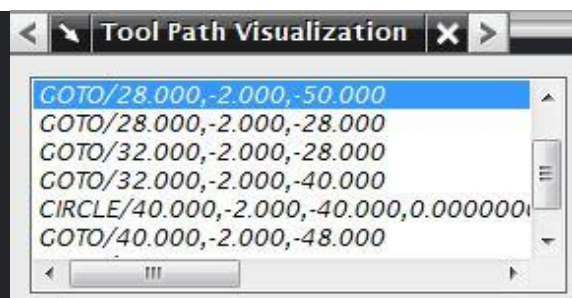
U – Shape Machining



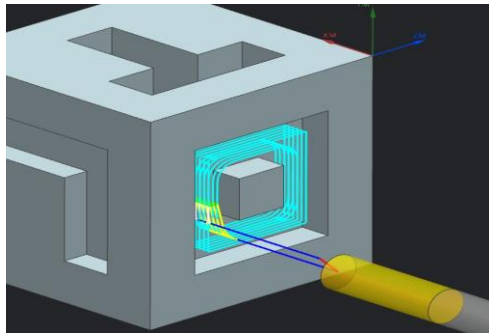
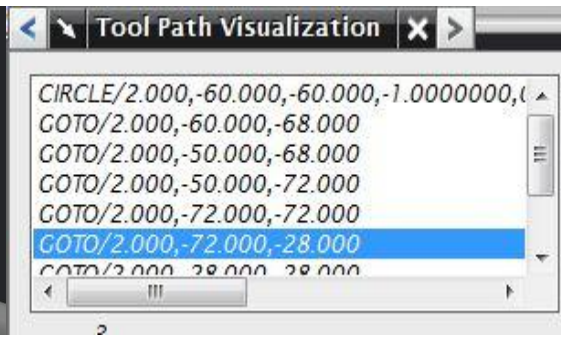
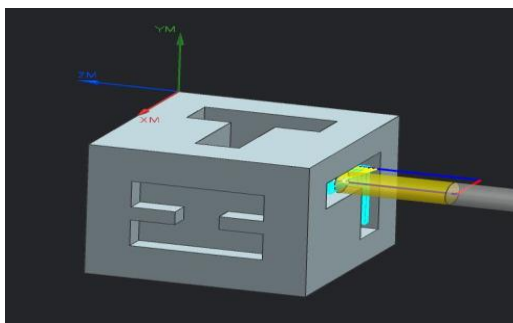
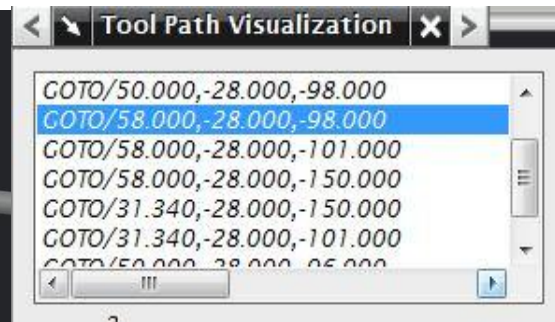
U – Shape Machining Tool Path Visualization



T-Shape Machining



T – Shape Machining Tool Path Visualization

**O-Shape Machining****O – Shape Machining Tool Path Visualization****L -Shape Machining****L – Shape Machining Tool Path Visualization**

NX CAM delivers a complete and proven solution for machine tool programming that enables companies to maximize the throughput of their most advanced machine tools. NX CAM, the manufacturing industries or companies can transform NC programming and machining processes to dramatically reduce waste and to increase productivity.

ADVANCED MACHINING CAPABILITIES WITH NX CAM

- Handle complex job requirements with ease
- The latest machining equipment & manufacturing processes Programming Automation
- Increase efficiency by capturing & reusing proven machining processes
- How you can save up to 90% on programming time by automating routine tasks
- Production Ready Output
- Right-first-time on the machine tool - detect potential collisions even before machining parts
- How to eliminate expensive try outs & testing on the shop floor
- Integrated Solution
- Eliminate the need for data translation between design & production
- How to machine and modify data from any system with synchronous technology
- Ease of Use
- A native Windows environment -- so users get up to speed quickly
- Minimized training time & cost
- Improved user productivity

BENEFITS OF NXCAM

The benefits of CAM include a properly defined manufacturing plan that delivers expected results in production.

- CAM systems can maximize utilization of a full range of production equipment, including high speed, 5-axis, and multi-function and turning machines, electrical discharge machining (EDM) and CMM inspection equipment.
- CAM systems can aid in creating, verifying, and optimizing NC programs for optimum machining productivity, as well as automate the creation of shop documentation.
- Advanced CAM systems with product lifecycle management (PLM) integration can provide manufacturing planning and production personnel with data and process management to ensure use of correct data and standard resources.
- CAM and PLM systems can be integrated with DNC systems for delivery and management of files to CNC machines on the shop floor.

NX CAM and CAM Express allow NC programmers to maximize the value of their investments in the latest, most efficient and most capable machine tools. NX CAM provides the full range of functions to address high speed surface machining, multi-function mill-turning, and 5-axis machining. CAM Express provides powerful NC programming with low total cost of ownership. NX Tooling and Fixture Design offers a set of automated applications for mold and die design, fixture design and other tooling processes built on a foundation of industry knowledge and best practices. Tecnomatix Part Planning and Validation allows manufacturing engineers, NC programmers, tool designers, and managers to work together to define and validate the part manufacturing process digitally. They can share tooling and resource libraries, and connect the plan data directly to shop floor systems such as DNC and tool management. [5]

CONCLUSIONS

The extraction of feature plays an important role in machining. The main object of this paper the extraction of feature by using NX CAD/CAM. NX provides complete computer-aided manufacturing (CAM) software solutions for machine tool programming, post processing and machining simulation. NX CAM's advanced functions approaches for selected modules can maximize returns on investments. The prismatic component in 2.5 D has been designed and simulated the machine process.

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